

1. A process for encoding data, comprising:

estimating forms of a plurality of functions, each function relating encoded size to encoded quality for an associated frame belonging to a sequence of frames, each frame having data for an image; and

estimating a best quality value for producing encoded frames whose encoded sizes satisfy one or more constraints, the constraints being associated with one of a transmission line bandwidth, a receiver buffer size and total compressed size, the estimating a best quality value being based in part on the functions.

2. The process of claim 1 further comprising

transmitting frames of the sequence wherein at least some of the frames are encoded with a quality based upon the best quality value.

3. The process of claim 1 wherein the transmitting includes transmitting at least some of the frames encoded with said best quality value.

4. The process of claim 1, wherein the estimating a best quality value includes executing a search that reduces the search range for said best quality value by subdivision.

5. The process of claim 4 wherein said search is a subdivision search algorithm.

6. The process of claim 4 wherein said search is a binary search algorithm.

7. The process of claim 1, further comprising:

encoding the frames of the sequence with the best quality value in response to the estimating.

8. The process of claim 7, wherein each encoded frame produces a group of temporally encoded pictures.

9. The process of claim 1, wherein each act of estimating one of the forms, further comprises:

3           computing a plurality of pairs of encoded quality and encoded size values for each  
4   frame of the sequence from encoded frame data; and

5           determining a functional relationship between values of the encoded quality and  
6   the encoded size for the plurality of frames from the pairs of values.

1           10.    The process of claim 9, wherein the computing further comprises:

2           encoding each frame of the sequence with a plurality of qualities to compute  
3   encoded data sizes associated with each of the plurality of qualities.

1           11.    The process of claim 10, wherein the acts of encoding of a frame with the  
2   plurality of qualities are performed in parallel.

1           12.    The process of claim 1, wherein the estimating a best quality value, further  
2   comprises:

3           selecting an encoded image quality of one of the plurality of frames; and  
4           deciding whether the encoded size associated with the encoded image quality  
5   satisfies a constraint based on one of transmission bandwidth, receiver buffering, total  
6   compressed size, and receiver prebuffering.

1           13.    The process of claim 12, wherein the deciding is based on two of the  
2   transmission bandwidth, receiver buffering, and receiver prebuffering.

1           14.    The process of claim 12, further comprising:

2           determining the encoded size associated with each encoded image quality from  
3   the form of the functional relation between the encoded quality and the encoded size for  
4   the associated frame.

1           15.    The process of claim 10, wherein the transmitting comprises:

2           selecting the one of the plurality of qualities having a closest value to the best  
3   quality value; and

4           wherein the transmitting sends frames encoded with the selected quality.

1           16.    A system for encoding image frames, the system comprising:

2           a variable bit-rate encoder; and

3 a controller connected to receive data on sizes on image frames encoded by the  
4 encoder and to control quality of the encoded frames produced by the encoder, the  
5 controller capable of causing the encoder to generate encoded data at a rate responsive to  
6 one or more of a bandwidth of a transmission line, space in a receiver buffer and a total  
7 size constraint.

1 17. The system of claim 16, wherein the controller  
2 is configured to determine a relation between quality of an encoded image frame and  
3 amount of encoded data from the received size data.

1 18. The system of claim 16, wherein the controller is configured to determine  
2 a best quality value for encoding an image frame from size data on data frames encoded  
3 with different qualities.

1 19. A program storage media storing computer executable instructions, the  
2 instructions to cause a computer to:

3 estimate forms of a plurality of functions, each function relating encoded size to  
4 encoded quality for an associated frame belonging to a sequence of frames, each frame  
5 having data for an image;

6 estimate a best quality value for producing encoded frames whose encoded sizes  
7 satisfy one or more constraints, the constraints being associated with one or more of a  
8 transmission line bandwidth, a receiver buffer size and a total size constraint, the  
9 estimating a best quality value being based in part on the functions; and

10 order transmission of frames of the sequence, at least some of the frames being  
11 encoded with a quality based on the best quality value.

1 20. The media of claim 19, wherein the instruction to estimate a best quality  
2 value causes the computer to execute a search.

1 21. The media of claim 20 wherein said search is a binary search algorithm.

1 22. The media of claim 19, the instructions further causing the computer to:  
2 encode the frames of the sequence with the best quality value in response to the  
3 estimating.  
4

1           23.     The media of claim 22, wherein each encoded frame produces a group of  
2 temporally encoded pictures.

1           24.     The media of claim 19, wherein each instruction to estimate one of the  
2 forms, further causes the computer to:  
3           compute a plurality of pairs of encoded quality and encoded size values for each  
4 frame of the sequence from encoded frame data; and  
5           determine a functional relationship between values of the encoded quality and the  
6 encoded size for the plurality of frames from the pairs of values.

1           25.     The media of claim 24, wherein the instruction to compute further causes  
2 the computer to:  
3           encode each frame of the sequence with a plurality of qualities to compute  
4 encoded data sizes associated with each of the plurality of qualities.

1           26.     The media of claim 19, wherein the instruction to estimate a best quality  
2 value, further causes the computer to:  
3           select an encoded image quality of one of the plurality of frames; and  
4           decide whether the encoded size associated with the encoded image quality  
5 satisfies a constraint based on one of transmission bandwidth, receiver buffering, and  
6 receiver prebuffering.